



## Trauma Associated Acute Navicular Salmonella Osteomyelitis

### Travma İlişkili Akut Naviküler Salmonella Osteomyeliti

Acute Navicular Salmonella Osteomyelitis

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*This study has been presented as a poster presentation in 58<sup>th</sup> National Pediatric Congress, Antalya, Turkey, 2014 (Kara SS, Polat M, Tapisiz A, Tezer H, Damar C. Trauma Associated Acute Navicular Salmonella Osteomyelitis. 58<sup>th</sup> National Pediatric Congress, Antalya, Turkey, 2014)*

#### Özet

Acute osteomyelitis (AOM) is a devastating disease with potential sequela and mortality in case of delay in diagnosis and treatment. Navicula can be involved rarely and Salmonella species can cause AOM in otherwise healthy children. In this report, a 4-year-old boy without immunodeficiency, sickle-cell disease, and any history of gastrointestinal symptoms or suspicious food consumption, but with an ankle sprain history, presented with acute navicular Salmonella osteomyelitis. He recovered without surgical intervention and complication. Trauma can facilitate salmonella osteomyelitis in otherwise healthy children. Prompt diagnosis and treatment can prevent complications and the requirement of surgical interventions in AOM.

#### Anahtar Kelimeler

Children; Navicula; Osteomyelitis; Salmonella Enteritidis; Sickle Cell Disease

#### Abstract

Akut osteomyelit tanı ve tedavide gecikme olması durumunda yol açabileceği olası sekeller ve mortalite nedeniyle tahrip edici olabilecek bir hastalıktır. Navikula nadiren tutulur ve Salmonella türleri de sağlıklı çocuklarda akut osteomyelite neden olabilir. Burada 4 yaşında, daha önce bilinen bir immün yetmezliği, orak hücreli anemisi, hiç bir gastrointestinal yakınma ya da şüpheli besin tüketim öyküsü olmayan, ancak ayak bileği burkulma öyküsü olan ve akut naviküler Salmonella osteomyeliti tanısı konulan bir erkek çocuk olgusu sunulmuştur. Hasta cerrahi geçirmeden ve komplikasyon gelişmeden iyileşmiştir. Travma, altta yatan hastalığı olmayan, sağlıklı çocuklarda Salmonella osteomyelitini kolaylaştırabilmektedir. Uygun tanı ve tedavi, akut osteomyelit komplikasyonlarını ve gerekebilecek bir cerrahi girişimi engelleyebilir.

#### Keywords

Çocuk; Naviküla; Osteomyelit; Salmonella Enteritidis; Orak Hücreli Anemi

DOI: 10.4328/JCAM.4162

Received: 30.11.2015 Accepted: 14.12.2015 Printed: 01.03.2016

J Clin Anal Med 2016;7(2): 279-81

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## Introduction

Acute osteomyelitis (AOM) is a destructive disease. It can result in chronic sequela and mortality in case of delay in diagnosis and prompt treatment. It may affect any bones, but has a predilection for the tubular bones of arms and legs, whereas bones of the feet, especially the navicula, are rarely involved in children [1]. *Staphylococcus aureus* is the most frequently seen causative agent of AOM [2], but sometimes *Salmonella* spp. are encountered in case of immunodeficiency, sickle-cell disease (SCD), previous trauma of affected bone, or skeletal prostheses [3]. *Salmonella typhimurium*, *Salmonella paratyphi B*, and *Salmonella enteritidis* are the most common *Salmonella* spp. that are associated with osteomyelitis [4].

In this report, a 4-year-old boy having acute navicular salmonella osteomyelitis without SCD or any immunodeficiency, but with associated trauma, is presented.

## Case Report

A 4-year-old boy, without a remarkable previous history, was brought to the Pediatric Infectious Diseases outpatient clinic due to complaints of pain, purulent discharge, and limping of his right foot. He had no history of consumption of raw, undercooked or unwashed food, or gastrointestinal symptoms, but he had a history of a right ankle sprain 10 days earlier. He had been given peroral ampicilline-sulbactam (SAM) with a diagnosis of cellulitis, for the previous 5 days. His vital signs were normal. He had purulent discharge, hyperemia, tenderness, and edema on the mediodorsal side of his right foot for two days (Figure 1). Laboratory results were: leukocytes, 10,740/mm<sup>3</sup>; C-



Figure 1. The clinical appearance of the lesion

reactive protein (CRP), 3.66 mg/dL; erythrocyte sedimentation rate (ESR), 55 mm/hr. The X-ray of the foot appeared normal, except for minimal soft tissue swelling. Gram stain of discharge revealed no bacteria, while Wright stain revealed 5-10 polymorphonuclear leukocytes. He was hospitalized and started 150 mg/kg/d intravenous SAM therapy with a diagnosis of cellulitis. The culture of discharge grew *Salmonella enterica* subspecies *enteritica* serotype *Enteritidis*. Bacterial identification and antimicrobial susceptibility testing were performed with BD Phoenix automated microbiology system (Becton Dickinson Diagnostic Systems, Sparks, MD, US). Serotyping was carried out by agglutination with *Salmonella* O and H antibodies (Statens Serum

Institut, Denmark) and antimicrobial MIC interpretive standards were defined according to Clinical Laboratory Standards Institute breakpoints [5]. The bacterium was sensitive to all tested antibiotics including SAM and trimethoprim-sulfamethoxazole (TMP-SMX). The blood culture was negative. Acute navicular osteomyelitis was diagnosed after magnetic resonance imaging (MRI) showed diffuse enhancing of the navicula corresponding osteomyelitis (Figure 2A&2B). His pain symptom and purulent



Figure 2. The MRI findings of the lesion. T1-weighted fat-suppressed sagittal MR image shows swollen midfoot with low signal intensity representing edema of soft tissue and bone marrow of tarsals (A). Contrast-enhanced T1-weighted fat-suppressed sagittal MR image demonstrates diffuse enhancing of the navicula (asterisks) corresponding osteomyelitis that extending to the peripheral soft tissue (B).

discharge on lesion responded well to treatment, so SAM was continued after culture results. The affected limb was immobilized completely for the first 2 weeks. No surgical intervention was carried out because of good clinical response. Hematological (sickling test and hemoglobin electrophoresis) and immunological (immunoglobulin levels, lymphocyte subgroups, interferon- $\gamma$  and IL-12-binding receptor levels) investigations were all negative. He was discharged on the 21st day of treatment with negative acute phase reactants. TMP-SMX (10 mg/kg/d) and non-weight-bearing immobilization of affected limb were continued for 3 weeks. At the end of the 6th week of treatment, he made an uneventful recovery except for rare pain while walking.

## Discussion

Acute navicular salmonella osteomyelitis is a rare, devastating disorder in terms of both causative agent and involved bone.

There are few reported cases of osteomyelitis caused by *Salmonella* spp in patients without immunodeficiency and SCD in the literature [4, 6]. The incidence of AOM has been reported as about 8/100,000 children per year in developed countries [1], but the data about the incidence of *Salmonella* osteomyelitis is scarce. It can involve any bones of the body and sometimes may be multifocal [4, 7, 8].

*Salmonella* osteomyelitis occurs generally after a pre-existing condition. Children with immunodeficiencies such as an impaired reticuloendothelial system or cellular immune response or SCD may have a predisposition. Adeyokunnu et al. reported 90% of patients with *Salmonella* osteomyelitis had SCD in their study [9]. Our patient did not have SCD, but a previous trauma of affected bones or skeletal prostheses can also increase the possibility of *Salmonella* osteomyelitis [3], as seen in our patient. Fever, inability to walk, or local findings around the affected bone, as in this case, should suggest osteomyelitis until discarded [1]. Fractures or any malignant condition should be kept in mind as differential diagnosis. Imaging is confirmatory in diagnosis of AOM. The prominent findings cannot be visible on plain radiography until 2 to 3 weeks after the onset of symptoms and signs [1]. MRI, which is one of the best imaging method for differentiating both cellulitis from osteomyelitis, and acute from chronic osteomyelitis [10], revealed AOM in this patient.

In AOM, etiological identification is possible in 50–80% of cases [2]. Cultures of blood, discharge, or surgical specimen must be performed at the earliest time before the start of antibiotic treatment. Although this patient had received antibiotic treatment previously, it was thought that *Salmonella* could be isolated because of the nature of bone infections. As surgical debridement was not required, the diagnosis couldn't be proved by histopathological examination [4]. Reports of the Centers for Disease Control and Prevention (CDC) indicate that the percentage of *Salmonella* enteritidis isolates resistant to TMP-SMX and  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations have not been so high during the last decade [11]. Nevertheless local resistance patterns should also be taken into consideration. In our patient, SAM was started due to empirical evidence and continued because of antibiogram results and clinical improvement of the patient. The optimal duration of antibiotherapy and the timing of transition from intravenous to oral therapy is a conflicting situation. The recommended duration of acute *Salmonella* osteomyelitis treatment is 4 to 6 weeks with appropriate antibiotics [12]. This patient completed 6 weeks of treatment. He made an uneventful recovery due to the rapid start of antibiotic treatment. Complications like chronic infection, growth arrest, leg length discrepancy, and spontaneous arthrodesis of surrounding joints have not been observed [13]. In conclusion, acute navicular salmonella osteomyelitis is a rare disorder. A history of trauma may be the only predisposing condition in the absence of other defined risk factors. Prompt diagnosis and appropriate antibiotic treatment affect the course of the disease positively without requiring surgical interventions.

#### Competing interests

The authors declare that they have no competing interests.

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#### How to cite this article:

Kara SS, Polat M, Tapısız A, Tezer H, Damar C. Trauma Associated Acute Navicular *Salmonella* Osteomyelitis. *J Clin Anal Med* 2016;7(2): 279-81.